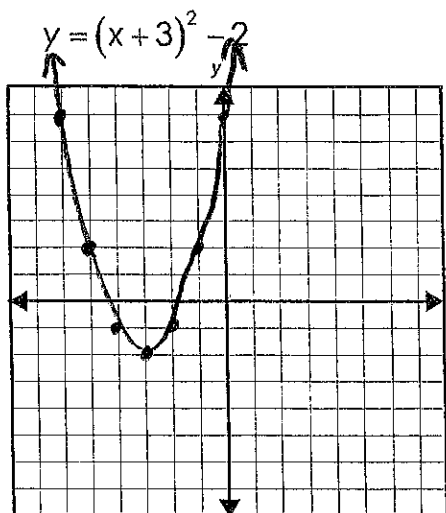


over 1 up 1
over 2 up 4
over 3 up 9

Graph each quadratic equation on the grid provided.

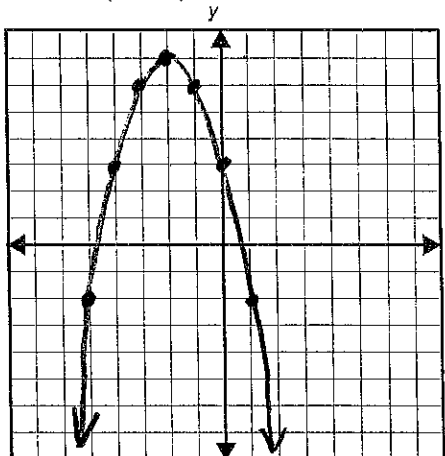
1)



$a = 1$
vertex
 $(-3, -2)$

2)

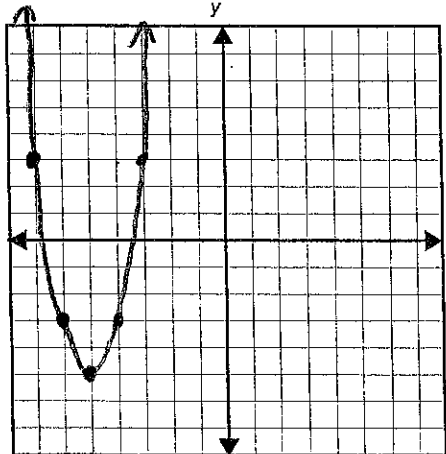
$y = -(x+2)^2 + 7$



$a = -1$
 $(-2, 7)$

3)

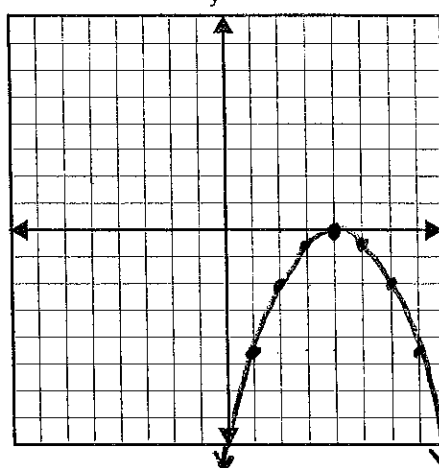
$y = 2(x+5)^2 - 5$



$a = 2$
vertex
 $(-5, -5)$

4)

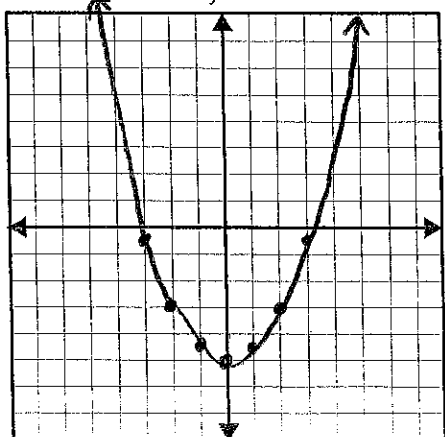
$y = -\frac{1}{2}(x-4)^2$



$a = -\frac{1}{2}$
vertex
 $(4, 0)$

5)

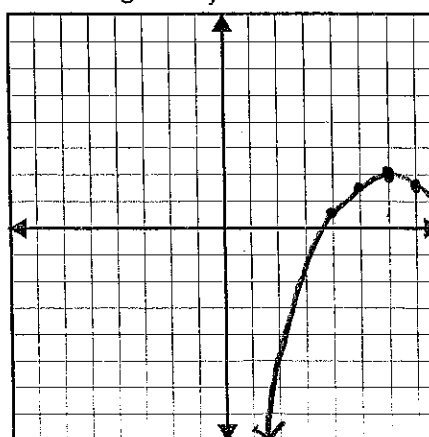
$y = \frac{1}{2}x^2 - 5$



$a = \frac{1}{2}$
vertex
 $(0, -5)$

6)

$y = -\frac{1}{3}(x-6)^2 + 2$



$a = -\frac{1}{3}$
vertex
 $(6, 2)$

Convert each of the following to vertex form.

7) $y = x^2 - 6x + 6$ $a=1$ $b=-6$ $c=6$

$$x = \frac{-b}{2a} = \frac{-(-6)}{2(1)} = \frac{6}{2} = 3$$

$$(3)^2 - 6(3) + 6 = -3$$

Vertex form: $y = (x-3)^2 - 3$

9) $y = 3x^2 - 30x + 76$
 $a=3$ $b=-30$ $c=76$

$$x = \frac{-b}{2a} = \frac{-(-30)}{2(3)} = \frac{30}{6} = 5$$

$$3(5)^2 - 30(5) + 76 = 1$$

Vertex form: $y = 3(x-5)^2 + 1$

8) $y = -x^2 + 4x - 7$ $a=-1$ $b=4$ $c=-7$

$$x = \frac{-b}{2a} = \frac{-4}{2(-1)} = \frac{-4}{-2} = 2$$

$$-(2)^2 + 4(2) - 7 = -3$$

Vertex Form: $y = -(x-2)^2 - 3$

10) $y = -\frac{1}{2}x^2 + 2x + 1$

$$a = -\frac{1}{2}$$
 $b = 2$ $c = 1$

$$x = \frac{-b}{2a} = \frac{-2}{2(-\frac{1}{2})} = \frac{-2}{-1} = 2$$

$$-\frac{1}{2}(2)^2 + 2(2) + 1 = 3$$

Vertex Form: $y = -\frac{1}{2}(x-2)^2 + 3$

Write the equation of the quadratic function given the following information.

11) vertex of (5,8) and y-intercept of (0,3)

$$3 = a(0-5)^2 + 8$$

$$3 = 25a + 8$$

$$-5 = 25a$$

$$\frac{-5}{25} = \frac{25a}{25}$$

$$-\frac{1}{5} = a$$

Equation: $y = -\frac{1}{5}(x-5)^2 + 8$

12) vertex of (0,5) and contains the point (1,-2)

$$-2 = a(1-0)^2 + 5$$

$$-2 = a + 5$$

$$-7 = a$$

Equation: $y = -7(x-0)^2 + 5$
 OR
 $y = -7x^2 + 5$

13) roots are $x=5$ and $x=-2$

$$(x-5)(x+2)=0$$

$$x^2+2x-5x-10=0$$

$$x^2-3x-10=0$$

Equation: $y = x^2 - 3x - 10$

14) roots are $x=-\frac{3}{4}$ and $x=-\frac{6}{5}$

$$(4x+3)(5x+6)=0$$

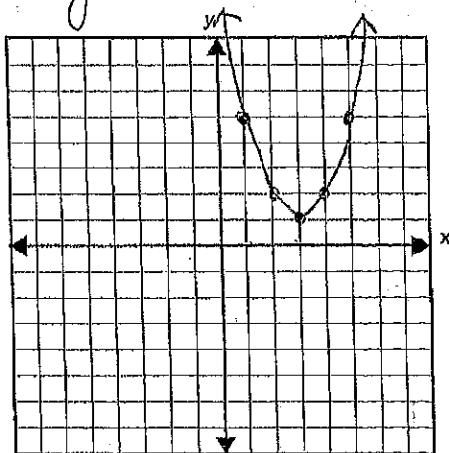
$$20x^2+24x+15x+18=0$$

$$20x^2+39x+18=0$$

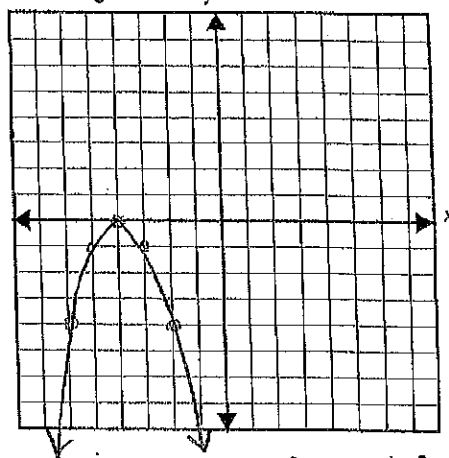
Equation: $y = 20x^2 + 39x + 18$

Write the equation of the quadratic function given the graph.

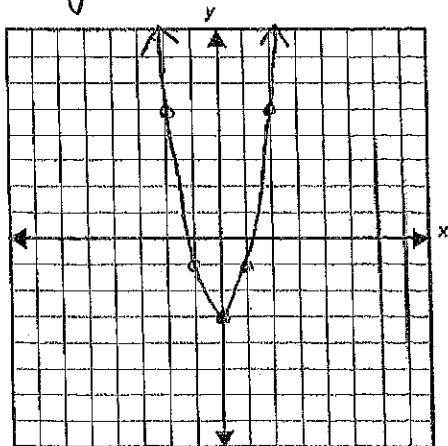
15) $y = (x-3)^2 + 1$



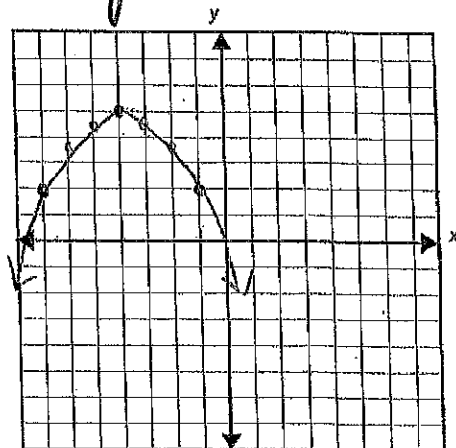
16) $y = -(x+4)^2$



17) $y = 2(x-0)^2 - 3$ or $y = 2x^2 - 3$

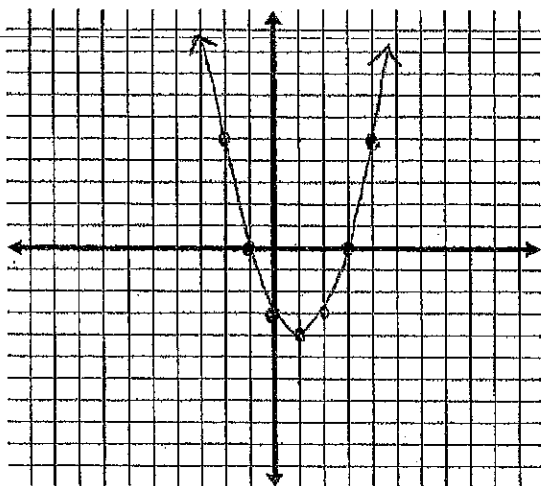


18) $y = -\frac{1}{3}(x+4)^2 + 5$



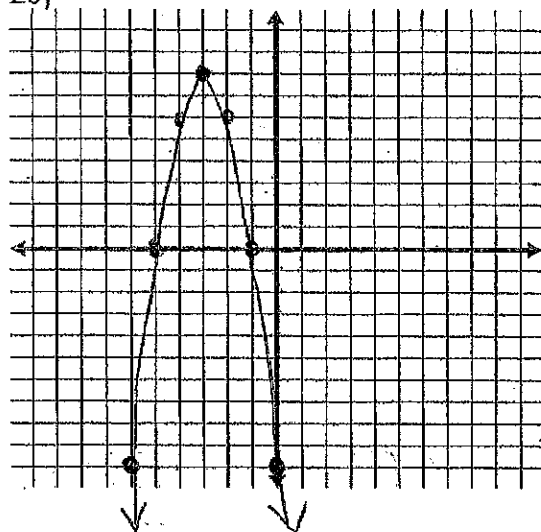
Answer the following questions based on the given graph.

19)



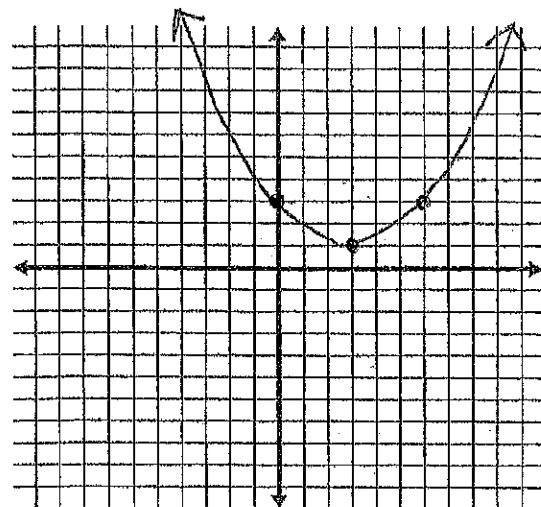
Domain $(-\infty, \infty)$
 Range $[-4, \infty)$
 Max/Min minimum $(1, -4)$
 Increasing $(1, \infty)$
 Decreasing $(-\infty, 1)$
 x-intercept $(-1, 0)$ and $(3, 0)$
 y-intercept $(0, -3)$

20)



Domain $(-\infty, \infty)$
 Range $(-\infty, 8]$
 Max/Min maximum $(-3, 8)$
 Increasing $(-\infty, -3)$
 Decreasing $(-3, \infty)$
 x-intercept $(-5, 0)$ and $(-1, 0)$
 y-intercept $(0, -10)$

21)



Domain $(-\infty, \infty)$
 Range $[-1, \infty)$
 Max/Min minimum $(3, 1)$
 Increasing $(3, \infty)$
 Decreasing $(-\infty, 3)$
 x-intercept none
 y-intercept $(0, 3)$

Factor each of the following COMPLETELY.

22) $x^2 - 3x - 18$

$$(x-6)(x+3)$$

23) $4x^2 - 9$

$$(2x-3)(2x+3)$$

24) $x^2 - 12x + 36$

$$(x-6)(x-6)$$

OR

$$(x-6)^2$$

25) $4x^2 + 20x + 25$

$$(4x^2 + 10x)(x+5)$$

$$2x(2x+5) + 5(2x+5)$$

$$(2x+5)(2x+5)$$

OR

$$(2x+5)^2$$

100	
1	100
2	50
4	25
5	20
10	10

26) $6x^2 - 5x - 21$

$$(6x^2 + 9x)(-14x - 21)$$

$$3x(2x+3) - 7(2x+3)$$

$$(3x-7)(2x+3)$$

-126	
1	-126
2	-63
3	-42
6	-21
7	-18
9	-14

27) $4x^2 - 16x + 15$

$$(4x^2 - 6x)(-10x + 15)$$

$$2x(2x-3) - 5(2x-3)$$

$$(2x-3)(2x-5)$$

60	
-1	-60
-2	-30
-3	-20
-4	-15
-5	-12
-6	-10

28) $10x^2 + 88x - 18$

$$2(5x^2 + 44x - 9)$$

$$(5x^2 + 45x)(x-9)$$

$$5x(x+9) - 1(x+9)$$

$$2(x+9)(5x-1)$$

45	
-1	45
3	15
5	9

29) $9x^2 + 30x + 24$

$$3(3x^2 + 10x + 8)$$

$$(3x^2 + 6x)(x+4)$$

$$3x(x+2) + 4(x+2)$$

$$3(x+2)(3x+4)$$

24	
1	24
2	12
3	8
4	6

Solve the following equations either by factoring or using the quadratic formula.

$$30) \quad x^2 - 4x = 5$$

$$\begin{array}{r} x^2 - 4x - 5 = 0 \\ (x+1)(x-5) = 0 \\ x+1=0 \quad x-5=0 \\ x=-1 \quad x=5 \end{array}$$

$$x = -1, 5$$

$$31) \quad 2x^2 + 3x = 20$$

$$2x^2 + 3x - 20 = 0$$

$$(2x^2 + 8x) - (5x - 20) = 0$$

$$2x(x+4) - 5(x+4) = 0$$

$$(x+4)(2x-5) = 0$$

$$\begin{array}{l} x+4=0 \quad 2x-5=0 \\ x=-4 \quad 2x=5 \\ \quad \quad x=\frac{5}{2} \end{array}$$

$$x = -4, \frac{5}{2}$$

$$\begin{array}{r} -40 \\ -1 \mid 40 \\ -2 \mid 20 \\ -4 \mid 10 \\ -5 \mid 8 \end{array}$$

$$32) \quad 3x^2 = 4x + 2$$

$$\begin{array}{r} 3x^2 - 4x - 2 = 0 \\ x = \frac{4 \pm \sqrt{(-4)^2 - 4(3)(-2)}}{2(3)} \\ x = \frac{4 \pm \sqrt{40}}{6} = \frac{4 \pm 2\sqrt{10}}{6} = \frac{2 \pm \sqrt{10}}{3} \\ x = \frac{2 \pm \sqrt{10}}{3} \end{array}$$

$$33) \quad 2x^2 + 5x = 7$$

$$2x^2 + 5x - 7 = 0$$

$$(2x^2 - 2x)(x+7) = 0$$

$$2x(x-1) + 7(x-1) = 0$$

$$(x-1)(2x+7) = 0$$

$$x-1=0 \quad 2x+7=0$$

$$x=1 \quad 2x=-7 \\ x=-\frac{7}{2}$$

$$x = -\frac{7}{2}, 1$$

$$\begin{array}{r} 14 \\ -1 \mid 14 \\ -2 \mid 7 \end{array}$$

$$34) \quad 3x^2 - x + 3 = 0$$

$$\begin{array}{r} x = \frac{1 \pm \sqrt{(-1)^2 - 4(3)(3)}}{2(3)} \\ x = \frac{1 \pm \sqrt{-35}}{6} = \frac{1 \pm i\sqrt{35}}{6} \\ x = \frac{1 \pm i\sqrt{35}}{6} \end{array}$$

$$35) \quad -5x - 10 = x^2$$

$$x^2 + 5x + 10 = 0$$

$$-5 \pm \sqrt{(5)^2 - 4(1)(10)}$$

$$\frac{-5 \pm \sqrt{-15}}{2} = \frac{-5 \pm i\sqrt{15}}{2}$$

$$x = \frac{-5 \pm i\sqrt{15}}{2}$$

36) Graph the following quadratic equation

$$y = x^2 + 6x + 5 \quad x = \frac{-6}{2} = -3$$

a.) Find axis of symmetry: $x = -3$

b.) Find the vertex: $(-3, -4)$

c.) Vertex form: $y = (x+3)^2 - 4$

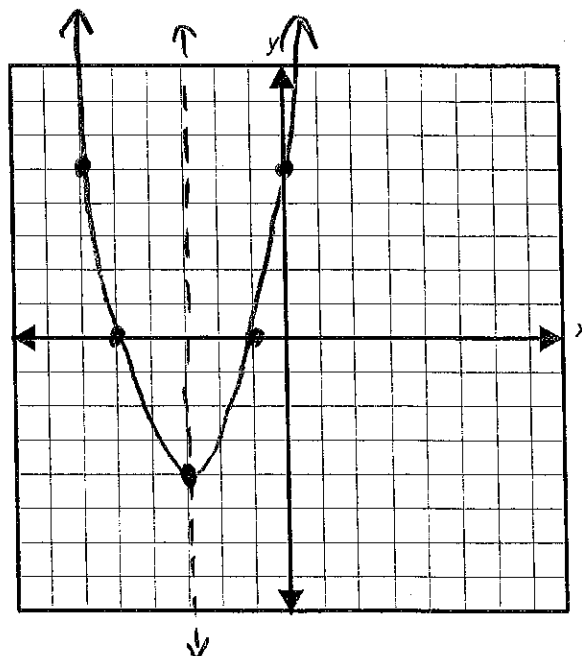
d.) Direction of Opening: UP

e.) Find the y-intercept: $(0, 5)$

$$(x=0) \quad y = (0)^2 + 6(0) + 5$$

f.) Find the x-intercept(s): $(-5, 0); (-1, 0)$

$$\begin{aligned} (y=0) \quad x^2 + 6x + 5 &= 0 \\ (x+5)(x+1) &= 0 \\ x+5=0 \quad x+1=0 \\ x=-5 \quad x=-1 \end{aligned}$$



37) Graph the following quadratic equation

$$y = -2x^2 - 4x + 1 \quad x = \frac{4}{2(-2)} = -1$$

a.) Find axis of symmetry: $x = -1$

b.) Find the vertex: $(-1, 3)$

c.) Vertex form: $y = -2(x+1)^2 + 3$

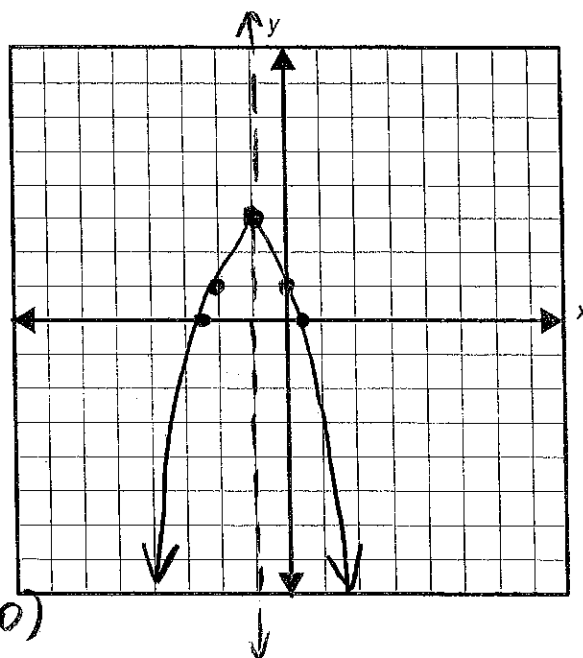
d.) Direction of Opening: DOWN

e.) Find the y-intercept: $(0, 1)$

$$(x=0) \quad -2(0)^2 - 4(0) + 1$$

f.) Find the x-intercept(s): $(-2, 0); (0.2, 0)$

$$\begin{aligned} (y=0) \quad -2x^2 - 4x + 1 &= 0 \\ \frac{4 \pm \sqrt{(-4)^2 - 4(-2)(1)}}{2(-2)} &= \frac{4 \pm \sqrt{24}}{-4} \end{aligned}$$



38) Graph the following quadratic equation

$$y = (x + 3)^2 - 1$$

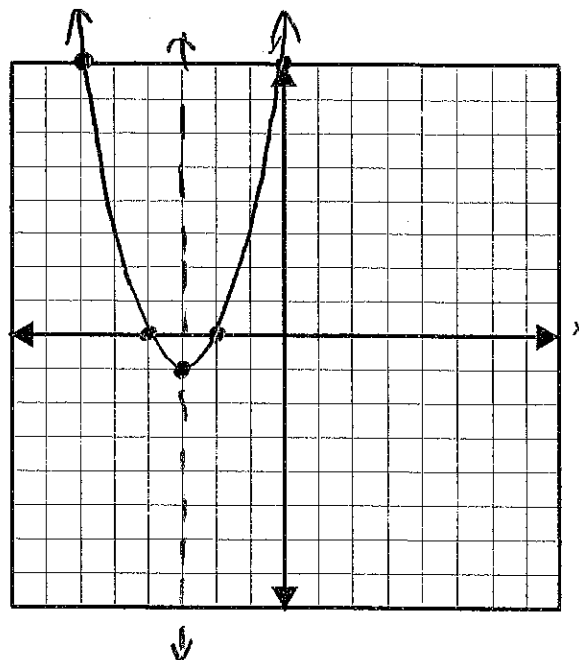
- a.) Find axis of symmetry: $x = -3$
 b.) Find the vertex: $(-3, -1)$
 c.) Direction of Opening: UP
 d.) Find the y-intercept: $(0, 8)$

$$(x = 0) \quad y = (0 + 3)^2 - 1$$

$$y = 8$$

- e.) Find the x-intercept(s): $(-2, 0)$; $(-4, 0)$
 $(y = 0) \quad \begin{aligned} (x + 3)^2 - 1 &= 0 \\ (x + 3)^2 &= 1 \\ x + 3 &= \pm 1 \end{aligned}$

$$x = -2$$



39) Graph the following quadratic equation

$$y = -\frac{1}{2}(x - 2)^2 + 3$$

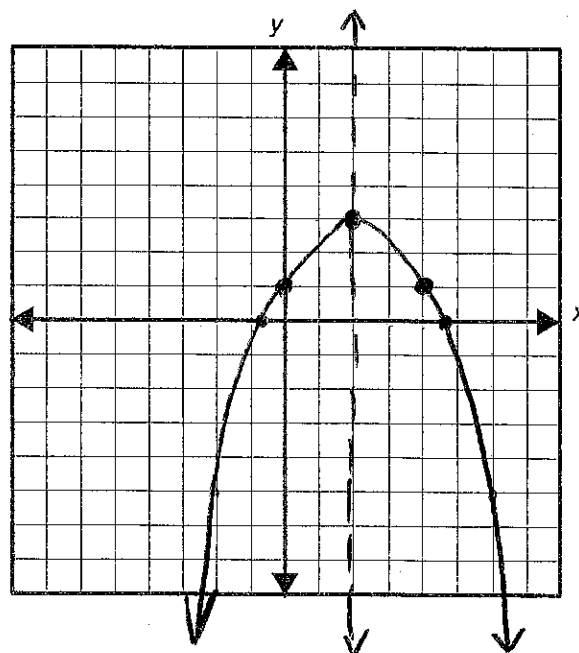
- a.) Find axis of symmetry: $x = 2$
 b.) Find the vertex: $(2, 3)$
 c.) Direction of Opening: DOWN
 d.) Find the y-intercept: $(0, 1)$

$$(x = 0) \quad y = -\frac{1}{2}(0 - 2)^2 + 3$$

$$y = 1$$

- e.) Find the x-intercept(s): $(4.5, 0)$; $(-0.5, 0)$
 $(y = 0) \quad \begin{aligned} -\frac{1}{2}(x - 2)^2 + 3 &= 0 \\ -\frac{1}{2}(x - 2)^2 &= -3 \\ (x - 2)^2 &= 6 \\ x - 2 &= \pm\sqrt{6} \\ x &= 2 \pm \sqrt{6} \end{aligned}$

$$x = 4.5$$



Perform the indicated operation for each complex number problem:

40) $(4+i) + (9-5i)$

$$4+i+9-5i$$

$$\boxed{13-4i}$$

41) $(13+15i) - (3+14i)$

$$13+15i-3-14i$$

$$\boxed{10+i}$$

42) $(2+5i)(3-7i)$

$$6-14i+15i-35i^2$$

$$6+i-35(-1)$$

$$6+i+35$$

$$\boxed{41+i}$$

43) $7i(2+9i)$

$$14i+63i^2$$

$$14i+63(-1)$$

$$\boxed{-63+14i}$$

44) $\frac{(3-i)}{(3+i)} \cdot \frac{(3-i)}{(3-i)} = \frac{9-3i-3i+i^2(-1)}{9-3i+3i-i^2(-1)}$

$$\frac{9-6i-1}{9+1} = \frac{8-6i}{10} = \boxed{\frac{4-3i}{5}}$$

45) $\frac{(5-3i)}{(4-5i)} \cdot \frac{(4+5i)}{(4+5i)} = \frac{20+25i-12i-15i^2(-1)}{16+20i-20i-25i^2(-1)}$

$$\frac{20+13i+15}{16+25} = \boxed{\frac{35+13i}{41}}$$

Cumulative Questions:

46) $3|2x-6|-7 > 29$

$$\frac{3|2x-6|}{3} > \frac{36}{3}$$

$$|2x-6| > 12$$

$$2x-6 > 12$$

$$2x > 18$$

$$x > 9$$

$$2x-6 < -12$$

$$2x < -6$$

$$x < -3$$

$$IN: (-\infty, -3) \cup (9, \infty)$$

47) Graph $2x-5y < 30 \Rightarrow -5y < -2x+30$
 $y > \frac{2}{5}x-6$

